REMARKS/ARGUMENTS

Status of Claims

Claims 2, 4 to 14, 16 to 23, 57 to 61 remain in the application.

Claim Amendments

Claim 10 has been amended to recite:

> wherein the header ~~symbols contain~~ symbol contains a frequency multiplexed dedicated pilot channel on dedicated pilot channel sub-carriers and common synchronization channel on common synchronization channel sub-carriers for each of the plurality of antennas;
>
> wherein the common synchronization channel is used to transmit a complex sequence which is different for each transmit antenna of one transmitter, but which is common for respective transmit antennas of ~~different transmitters~~ each transmitter within a communications network.

wherein strikethrough text has been deleted from the claim and text that is underlined has been added to the claim. The expression "the header symbols contain" has been replaced with "a header symbol contains" as this is the initial introduction of the head symbol. The claim has been amended to recite "frequency multiplexed" to emphasize that manner in which the pilot and synchronization symbols are multiplexed.

Claim 17 has been similarly amended. The preamble of claim 17 has been further amended to replace "plurality of antennas" with "plurality of transmit antennas".

The word "operable" in the preamble of claims 10 and 17 has been replaced with "configured".

The addition of the word "frequency" preceding the word "multiplexed" is to more explicitly state that it is frequency multiplexing that is being performed.

The replacement of "different transmitters" with "each transmitter" is to emphasize that it is all transmitters that are using the common synchronization channel in the manner recited.

Claims 4, 13, 14, 18 and 22 have been amended to replace "symbols" with "symbol". In claim 13, "dedicated pilot channel" has been replace with "dedicated pilot channel sub-carriers" and "common synchronizing channel sub-carrier" with "common synchronizing channel sub-carriers". In claim 18, "plurality of antennas" has been replaced with "plurality of transmit antennas"

Claims 5 and 11 have been amended by replacing "operable to transmit" with "that transmits".

In claim 8, the expression "any one of claims" has been replaced with "claim".

Claims 16 and 19 have been amended by replacing "operable to receive" with "that receives".

Claims 20 and 21 have been amended by replacing "being operable to perform" with "performing". Also in claim 21, the word "have" has been replaced with "has".

Claim 22 has been amended by replacing "being further operable to perform". Claim 23 has been amended by replacing "further operable to perform" with "that performs".

Claim Objections

The Examiner has objected to claims 5, 16, 19 and 22 based on use of the expression "operable to". The claims, amended as described above, now positively recite the subject matter in a manner that is non-optional.

35 U.S.C. 103 Rejections

The law on obviousness under 35 U.S.C. 103 was recently addressed in ***KSR Int'l v. Teleflex, Inc.***, *No. 04-1350, slip op. at 14 (U.S., Apr. 30, 2007).* Following this, examination guidelines were released by the USPTO on October 10, 2007 in regards to determining obviousness under 35 U.S.C. 103. According to these guidelines, the framework for the

objective analysis for determining obviousness under 35 U.S.C. 103 is stated in ***Graham v. John Deere Co. 383 U.S. 1,148 USPQ 459 (1966).*** Obviousness is a question of law based on underlying factual inquiries. The factual inquiries enunciated by the Court are as follows:

(1) Determining the scope and content of the prior art;

(2) Ascertaining the differences between the claimed invention and the prior art; and

(3) Resolving the level of ordinary skill in the pertinent art.

The Graham factors, including secondary considerations when present, are the controlling inquiries in any obviousness analysis. Once the findings of fact are articulated, Office personnel must provide an explanation to support an obviousness rejection under 35 U.S.C. 103. According to KSR, for the Patent Office to properly combine references in support of an obviousness rejection, the Patent Office must identify a reason why a person of ordinary skill in the art would have sought to combine the respective teachings of the applied references.

Applicant's analysis below demonstrates that the Examiner has failed to properly conform to the aforementioned guidelines for a finding of obviousness under 35 U.S.C. 103.

The Examiner has rejected claims 2, 4, 7, 8, 10 to 14, 16 to 18 and 20 under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. (U.S. Patent No. 6,473,467) in view of Baum et al. (U.S. Patent No. 5,867,478).

Claim 10

Missing Elements

The following is a discussion of why the cited references do not disclose all the elements of the rejected claim. While it may be considered that "the mere existence of differences between prior art and an invention does not establish the invention's non-obviousness", Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one skilled in the art (Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR international Co.* v. *Teleflex Inc.*, published in Federal Register Vol. 72,

No. 195 October 10, 2007). As such, if elements from a claim are not disclosed by the combination of cited references and no valid reasoning is provided why the missing elements would be obvious, this may provide a strong basis for why a claim should not be rejected based on obviousness.

With respect to claim 10, the Examiner alleges that Wallace discloses all the limitations of the claims, except that Wallace does not disclose "header symbols containing both a multiplexed dedicated pilot channel and a common synchronization channel" or "the common synchronization channel transmitting a different sequence for each antenna of a transmitter but using the same sequences in transmit antennas of different transmitters". It is alleged that Baum et al. discloses these limitations.

At the bottom of page 4 of the current Office Action, the Examiner indicates that Baum et al. discloses an OFDM system using a multiplexed pilot channel, common synchronization channel and broadcasting channel repeated in a predetermined order at col. 8, lines 53 to col. 9, line 6. The Examiner is alleging that this is equivalent to the limitation "the header symbol contains a frequency multiplexed dedicated pilot channel on dedicated pilot channel sub-carriers and common synchronization channel on common synchronization channel sub-carriers for each of the plurality of antennas". With respect, what is being disclosed in Baum et al. is a common frame format having, amongst other features, "pilot codes in the same locations within a slot. However, different pilot codes are used in the sectors of closest co-channel cells to the extent of the number of available pilot codes". Therefore, different codes are explicitly disclosed for the same sections, i.e. corresponding transmit antennas of adjacent transmitters.

Baum et al. discloses that portions of a frame, such as a synchronization portion, may be shared via time, frequency, or code division, or any combination of thereof. However, Applicant submits that such a broad statement provides no specific disclosure as to how such a shared synchronization portion would be shared or in fact what the intended meaning of "shared" refers to. Furthermore, the sharing is disclosed to be "preferably coordinated in accordance with the pilot code re-use plan" (col. 9, lines 5-6). This being the case, one would expect the synchronization information to located in a common location in the frame, be

synchronized with other transmitters, but still be transmitted in such a way that it is dedicated for each antenna serving a respective sector based on being coordinated with the frequency re-use plan, not necessarily "common" to each of the plurality of antennas. If a frequency re-use plan is used to avoid interference, this means a different frequency is being used for each section, in which case there is not a common frequency for each antenna of the plurality of antennas. The embodiment described at col. 9, lines 11-27 specifically describes that the synchronization channel is divided "into orthogonal regions via time, frequency, or code orthogonality, or some combination thereof" and each base unit (transmitter) I assigned one region for transmission.

Therefore, Applicant submits that even if it were considered that Baum et al. discloses a dedicated pilot channel, which Applicant does not concede, there is no suggestion or disclosure of a common synchronization channel for each antenna of the plurality of antenna.

Furthermore, Applicant submits that simply because Baum et al. discloses a common frame format that can be used with pilot codes and for "sharing" portions of a transmission frame, does not mean that any and all combinations of transmitting dedicated pilot information and common synchronization information are considered obvious. The present claims are directed to a particular mechanism in which "the header symbol contains a frequency multiplexed dedicated pilot channel on dedicated pilot channel sub-carriers and common synchronization channel on common synchronization channel sub-carriers for each of the plurality of antennas", and Applicant submits that this specific combination of limitations is not suggested or disclosed by Baum et al.

At the bottom of page 5 of the present Office Action, the Examiner alleges that Baum et al. discloses transmitting a different sequence for each antenna of a transmitter, but using the same sequences in transmit antenna of different transmitters at i) col. 4, lines 32-45, ii) col. 6, lines 1-65 and iii) col. 9, lines 7-36. The Examiner is alleging that this is equivalent to the limitation "wherein the common synchronization channel is used to transmit a complex sequence which is different for each transmit antenna of one transmitter, but which is common for respective transmit antennas of different transmitters within a communications network". The amended claim recites "is common for respective transmit antennas of each transmitter"

(emphasis added). Applicant submits that Baum et al. does not teach this limitation, as will be discussed below with regard to Figure 3 in Baum et al.

The subject matter disclosed at col. 4, lines 32-45 is a set of requirements for SC-OFDM. The requirements include OFDM signal transmissions are to be synchronized, a cyclic extension is used to absorb delay spread and propagation delay between transmitters, reference/pilot signals are orthogonal and a common transmission format is to be used. There is no disclosure of transmitting a common synchronization channel including "a complex sequence which is different for each antenna of one transmitter, but which is common for respective transmit antennas of each transmitter" in the cited portion of Baum et al.

The subject matter disclosed at col. 6, lines 1-65 pertains to a cell re-use scheme. A pilot code re-use scheme is discussed in which adjacent cells use different pilot codes to avoid ICI and ISI and allow the capability to individually measure the channel responses of co-channel interfering signals. In Figure 3 of Baum et al., the description of which falls within col. 6, lines 1-65, different pilot codes are used for the same respective sector of adjacent cells, indicated as A, B, C, and D. There is no suggestion or disclosure of a common synchronization channel used in conjunction with what is disclosed in Figure 3. While the frequency re-use scheme disclosed by Baum et al. does re-use pilot codes on multiple transmitters, as shown in Figure 3, the frequency re-use scheme does not include a common synchronization channel that is "used to transmit a complex sequence which is different for each transmit antenna of one transmitter, but which is common for respective transmit antennas of each transmitter within a communication network".

The subject matter disclosed at col. 9, lines 7-36 pertains to transmission of a synchronization signal. Baum et al. discloses that a "frame region dedicated to this purpose is divided into preferably orthogonal regions via time, frequency or code orthogonality, or some combination of these. Then each base unit is assigned one of the regions for transmitting its synchronization signal. The assignment to these regions is done in way that is preferably similar to the way the allocation of pilot codes was done for the base units". Since Baum et al. discloses the allocation is preferably done in a manner that is similar to the way that pilot codes are allocated, one would assume this includes the re-use scheme as well, in which case there is

no suggestion or disclosure that the synchronization signal is "used to transmit a complex sequence which is different for each transmit antenna of one transmitter, but which is common for respective transmit antennas of each transmitter within a communication network". Furthermore, while the OFDM signal transmissions are disclosed to be synchronized to "a reference where the reference is derived from a common source" (abstract of Baum et al.), there is no disclosure that the synchronization channel is common to corresponding antennas on each transmitter.

For at least the reasons discussed above, Applicant respectfully submits that the combination of Wallace and Baum et al. do not teach all the limitations recited in amended claim 10. Furthermore, the Examiner has failed to explain why the missing limitations would be obvious to one skilled in the art. Without all the limitations of claim 10 being disclosed by the two references and no reason provided by the Examiner why these missing limitations would be obvious, it is not reasonable to expect one skilled in the art to arrive at the claimed invention.

Reason to Combine

Once the scope of the prior art is ascertained, the content of the prior art must be properly combined. An obviousness inquiry requires review of a number of factors, including the background knowledge possessed by a person having ordinary skill in the art, to determine whether there was an apparent reason to combine the elements of the prior art in the fashion claimed by the present invention. For the Patent Office to combine references in support of an obviousness rejection, the Patent Office must identify a reason why a person of ordinary skill in the art would have combined the references ***KSR Int'l v. Teleflex, Inc., No. 04-1350, slip op. at 14 (U.S., Apr. 30, 2007)***, Id. at 15. Even if the Patent Office is able to articulate and support a suggestion to combine the references, it is impermissible to pick and choose elements from the prior art while using the application as a template.

Applicant submits that there is no suggestion of a desirability of the claimed invention in the references that would serve as a reason for one skilled in the art to combine the references.

Applicant submits that in the background section of Baum et al. pilot symbol based coherent modulation is discussed and it is stated that pilot symbol based coherent modulation does not provide the capability to individually measure the channel responses of co-channel interfering signals (col. 1, lines 21-41), which is a problem that Baum et al. is attempting to solve with the subject matter disclosed in the patent. Furthermore, at col. 5, lines 24-27, Baum et al discloses "The third requirement can be satisfied by using pilot codes rather than individual pilot symbols in each OFDM slot for channel response estimation". Applicant submits that based on such a comment Baum et al. does not use pilot symbols as recited in the present claims and therefore Baum et al. teaches away from the claimed invention. As such, Baum et al. would not be considered by one skilled in the art as a relevant reference to be used alone or in combination with other references.

The Examiner's motivation for combining Wallace with Baum et al., set out at the top of page 5 with respect to a first limitation (discussed above) alleged to be disclosed by Baum et al. and set out at the top of page 6 with respect to a second limitation (also discussed above) alleged to be disclosed by Baum et al., are tied to his view that Baum et al. teaches these first and second limitations. As detailed above, this was an incorrect interpretation of Baum et al., and as such this also affects the Examiner's motivation argument.

On the basis of the above, Applicant respectfully submits the Examiner has not provided a reason why a person of ordinary skill in the art would have combined the references. The Examiner is respectfully requested to withdraw the rejection of claim 10 under 35 U.S.C. 103(a) as set out in paragraph 4 of the Office Action.

Claims 2, 4, 7, 8, 11 to 14, 16 to 18 and 20

It is noted that the above discussion has focused on claim 10. Similar comments apply to claim 17.

Furthermore, with regard to claims 4, 12, 14 and 18 it is alleged that Baum et al. discloses the limitation of broadcasting sub-carriers being included in the header. Applicant submits that col. 8, lines 53 to col. 9, line 6 of Baum et al. does not disclose multiplexing broadcasting sub-carriers together with dedicated pilot and common synchronization carriers

for each of the plurality of antennas. As indicated above, Applicant submits that there is only disclosure of a synchronization portion of a frame being "shared" and it is unclear what this actually means.

The remaining claims objected to by the Examiner depend upon claim 10 or 17 either directly or indirectly. Applicant is not conceding that the additional features recited in these dependent claims are found in the references as set out by the Examiner. However, it is respectfully submitted that it is not necessary to address these issues at this time in view of the strong case for patentability of the independent claim 10.

Claims 5, 6, 9, 19 and 21 to 23

In paragraphs 5, 6 and 7 of the detailed action, claims 5, 6, 9, 19 and 21 to 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. in view of Baum et al. and in further view of one or both of Mody et al. (U.S. Patent No. 7,088,782) and Applicant's admitted prior art. Applicant respectfully submits that these claims depend upon either claim 10 or 17 and, as such, should be patentable for all of the reasons set out above. For this reason, it is respectfully submitted that it is not necessary for the Applicant to address the additional combination of the two cited references relied upon previously with one or both of Mody et al. and Applicant's admitted prior art. Please note that in so doing, Applicant does not concede that the so-called "Applicant's admitted prior art" is, in fact, "prior art."

Claims 57 to 61

In paragraph 8 of the detailed action, claims 57 to 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. in view of Applicant's admitted prior art. Applicant's arguments from the Office Action date June 8, 2007 are repeated at this time. The Examiner's statement in paragraph 9 that all the arguments are considered moot is not correct as the objection to claims 57 to 61 is based on the same objection as the previous Office Action, which does not include the newly cited reference Baum et al.

The Examiner is correct that Wallace et al. teaches an OFDM symbol having a prefix that is a cyclic repetition. However, referring to Figure 1B, this cyclic repetition or prefix is

attached to the beginning of every OFDM symbol. That is the conventional approach. Wallace does not specifically disclose transmitting an OFDM preamble having a prefix that is a cyclic repetition, as recited in Applicant's claims.

The Examiner argues that Applicant's admitted prior art discloses using multiple identical header symbols. Applicant respectfully disagrees. The Applicant's admitted prior art refers to "using multiple identical headers". However, there is nothing to suggest these are not transmitted in the same way as a conventional OFDM symbol structure, namely a prefix followed by a header symbol. Thus, the Applicant admitted prior art is teaching a preamble of the following form:

Prefix	Header Symbol	Prefix	Header Symbol

whereas, claim 57 teaches a preamble of the following form:

Prefix	Header Symbol	Header Symbol

Note that the advantage of this approach is that there is a savings of bandwidth by not having to include a prefix for the second header symbol.

On this basis, it is respectfully submitted that neither Wallace nor the Applicant's admitted prior art teach the aspects of claim 57 identified by the Examiner and as such the Examiner is respectfully requested to withdraw the rejection of claim 57 under 35 U.S.C. 103(a). Claims 58 to 61 all depend upon claim 57 and should be patentable for the same reasons.

In view of the fact that all of the Examiner's rejections have been addressed, the Examiner is respectfully requested to allow the application.

In view of the foregoing, early favourable consideration of this application is earnestly solicited.

Respectfully submitted,

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